Notebook Series -- Notebooks by Edison
Notebook, N-13-12-08.2

This notebook was used during the period December 1913-May 1914. The entries, which are by Edison and Sherwood T. (Sam) Moore, pertain primarily to the molding, transfer, and printing processes involved in disc record manufacture and to the construction of record blanks. The entries at the beginning of the book describe experimental transfers and indicate the effect of polishing the molds used to print the records. Additional entries relate to the surface qualities and treatment of the master records onto which recordings were made, forming the base for subsequent molds. Another group of notes describes experiments with bumps or "tits" on record blanks to determine if and how the surface might become smooth when heated. The entries in the remainder of the book describe a sequence of experiments, numbered from 12 through 369, which involved pressing powder in blank molds with a pure rubber plunger "to get even pressure all over" during the formation of record blanks. The goals were to smooth off the surplus stock (using various scrapers) after the rubber pressure without disturbing the pressed powder and to prevent the powder from sticking to the rubber. The entries for experiments 12 through 44 are by Edison. Among the results noted are the thickness of the blanks, transfers, and prints, as well as the quality of the transfers and prints. The results of the remaining experiments, recorded by Moore, appear in tabular form. The notes indicate that H. Grimes also assisted Edison. Inserted into the book is a note to employee F. C. Pullin regarding an old dynamo belonging to Edison. In addition, there are seven pages of typewritten comments, which were prepared by former employee William A. Hayes during the late 1940s or early 1950s for Vice Admiral Harold G. Bowen, executive director of the Thomas A. Edison Foundation, and Norman R. Speiden and Harold S. Anderson, curators of the Edison laboratory. The front cover is labeled "8 December 1913," "Mr Moore," and "Experiment on Blank." The book contains 135 numbered pages.

N-13-12-08.2 E5735

Note:

R.O. = run out, mea = music
run out or fades out, due
to light printing

Lyle L. Rust
1/22/1979

Acme Co.
MFG. STATIONER
96 [illegible]
19 [illegible]
N.Y. [illegible]
54472

Evidently not condensed
& surface separated

Vac Dryer 160 Fahr till powder dry
3 to 3 1/4 hours –

719 B not baked – pressed 1000
lbs at 10 lbs vacuum —

Transferred 900 lbs pressure
80 lbs vacuum

2 min Contact
1 Loss –
5 – Hugh 900 lbs
Van 632 Lot 15555 –
3 free one black –

2 OK
2 had small peels outs
but well present OK

Print Reg Schedule

1 hard	faint
2 "	RO
1 fair	RO
2 hard –	RO
1 fair	RO.
2 fair to good	faint
1 fair to good	faint
2 hard	RO

719 - 1000 - LBs Lot 350 -
Rotating top dive in Drill at
Lab -

Transfd Req 800 LBs

Printed 1st time Music OK
Edges thin slight fill —

Printed 2nd time on flat
Master Mounted -

1 good
2 "

vvv faint
no RO

2nd 1 had chillers marks from rotating
dive

Extra good 1 good
2 good

no RO
no RO

Dup of 18 – 719 – heavy loaded at Edge tapping & scraper –
6 blanks transferred 2 men Concaved
1 men Low 5 High 1000 lbs
4 OK 1 didn't fell & Cracked 3/16 from Edge other side OK –
not filled cracks –

One blank OK one side other has small pull out & cracks –

Prints = 5 OK – 1 wide Edges of red & Cracks –

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15 good –	vvv faint
67 good – dirty Yellow	v faint
15 fair to good	faint
67 fine	vvvv faint
15 fair to good –	v faint
67 good	vvvv faint
15 good –	v faint
67 good –	vvvv faint
15 fair –	no RO
67 fine	no RO
15 good	no RO
fine	vvvv faint

Dup of preceding page
with exception of 1000 lbs on
Long Schedule 7 3 & 7 - Crack

Transfers 6 all OK one has pull
out around hole both sides

Prints all have very wide red edges
unlike Short schedule -
Cracked Edge wide red III
OK III. Long Schedule seems bad for
printing

15 - fair	faint
67 fair -	VV faint
15 good -	V faint
67 good	RO. Edge faint Cap alone Eng
15 good	V faint
67 good	faint
15 fair & good -	V faint
67 good	VV faint
15 good -	No RO
67 good	faint
15 good	No RO
67 "	V faint

Dec 8 1913 — (5)

719 - Reprints

24 picked out to represent them several times —

1 Reprint - 21 OK 3 poor prints labels OK

2nd same 24 — 22 OK 2 poor prints "

3rd same 24 17 OK 5 " 1 poor label 1 ckd

4th " 20 K 3 poor prints 1 ckd, labels OK

Note - discard Cracked one,

12 tested = 9 surface good although considerable number small imps at start 1 Bad Run out, one a slight RO as its the Cracked one 8 Had No RO, 1 VVVV -

This shows Can represent OK & get a high percentage,

Will continue to print these

2074 – Marles No Romeo & Juliet
Vocal – Blacks bad. Moore
Reported it Oct 15th – 72
Hayes never said anything –
Hadn't given practice –
All Eternity 1265 –
Thus also blacks bad –
Given practice this
also.

444 719 blanks — 1

Records printed —

Qual Rejected

47 Knocks

15 Cracked

30 Run outs

30 Cracked

42 Bad print

2 scratched

1 Rough surface

12 Poor Label —

90% blanks passed

60% —

74% of Moved Labels taken off

RO out tested by Edison

1 = 2 } OK. pass it faint — Thus could pass
V V V V.

1 } w flowers — to much RO on start
2 } OK —

(8)

1 } Little too much RO — Mary
2 } Louisa Pierce — too much RO

1 } Louisa Pierce — too much RO
2 } OK Mary

1 } Battle Creek — Bad RO
2 } — OK

1 } Loveland Wally — Bad RO
2 } OK

1 } Cohoman — Too Much RO to pass
2 } ——

1 } Cohoman, Cant hear much RO,
2 } This should have been passed its very good for small RO

(9)

1 } - Cavalier Limit, this Could pass
2 } - OK. nothing worse

1 } My Heart, OK
2 } Run Out - demanded too much

1 } Magpie OK.
2 } Too Much Run Out

1 } Magpie OK not too much RO
2 } Too much RO,

1 } Magpie - Little too much RO
2 } Too much RO

1 } Magpie, Little too much RO
2 } Very Bad RO

(10)

1 } Apple Normandy #18 moved Bad RO
2 } OK -

1 } Normandy #10 moved — Bad RO -
2 } OK —

1 } Normandy #10 moved Bad RO
2 } — Little Too much -

1 AB Normandy #8 M — RO on Limit - pass
2 — Beyond Limit for RO

1 AB Normandy — #2 moved within Limit
2 OK for RO —

1 } Normandy #2 moved OK within limit
2 } — RO Bad - No 8 moved

1 } Jay of my heart OK
2 } ~~Sleepy~~ Rose - just within limit

1 } Jay my heart: OK
2 } ~~Sleepy~~ Rose - OK } OK

(11)

1 } Wissens OK
2 } Too much RO –

1 } Mecrosz OK
2 } Too much RO

1 } In Cairo – RO too much
2 } OK –

1 } ~~Cairo~~ Cavatina Too much RO
2 } OK

1 } In the Bird – Too much RO
2 } Limit allowance –

1 } Mocking Bird OK –
2 } ~~A~~ OK not too much } OK

1 }
2 }

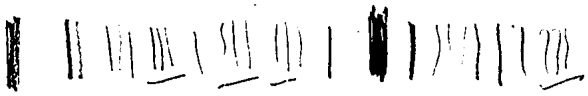
(12)

Dec 7 1913

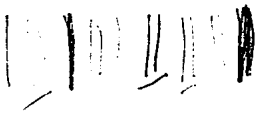
By polishing Mocking Bird working round 3 times, 6 times over each time –

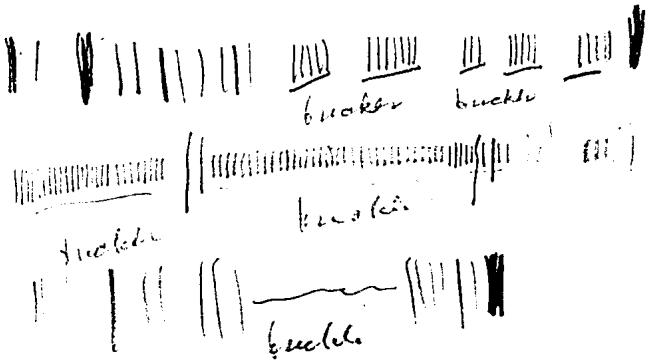
+ touching Rosin before playing + after 3 times each time 7 19 blades – That surface wholesomely – unmistakably improved, instead of a sharp loud general scratch the playing softened it made it velvet, the fine Crackles are only softened – It's prominent qlities Playing Mocking Bird + then Lotka moved wood make it very good –

Used Carnelian to rub the bridge Rosings + I think Rosin



has a knock nearly every revolution at place





Grafited Mueller Tracked Blank
G4 — 3 turns of big Cam
1st one done automatically —
1 Rev in 45 seconds —

VVV RO — Rather Good General surface
seems of surface was made up of
very fine cracks. Has a ring in
addition to general scratch —

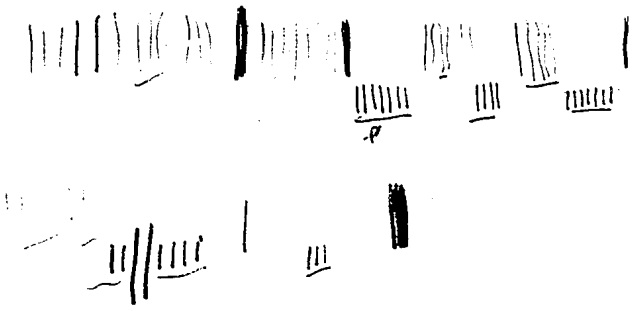
Not good
Enough

G4 2nd Print

V RO — surface better than 1st print
Bad buckling about — Rings bad,
Surface pretty fair,

Probably trouble is 1st
Coat too thin, should be
2 or 3 times thicker, when
we turn over to Reg Cathe
Either surface gets bad or not well good
or depends on quality of Copper

(15)



(16)

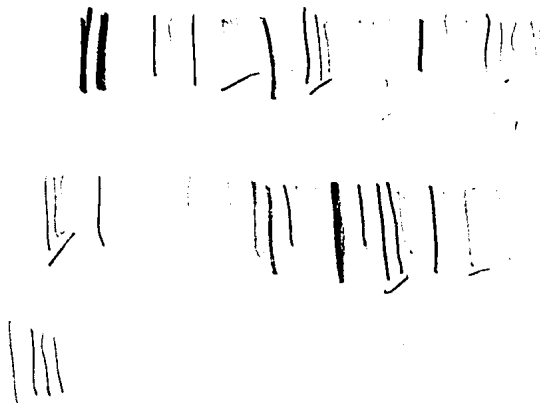
G-5 = grafted 10 turns of Cam —

VVV. Rings - velvet - VV —
now only heard RD V — Rings
Cant hear great impact. to rings however

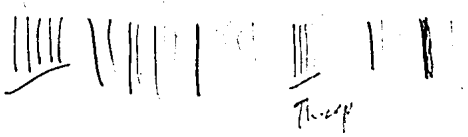
Not good Enough

(17)

Bad Start

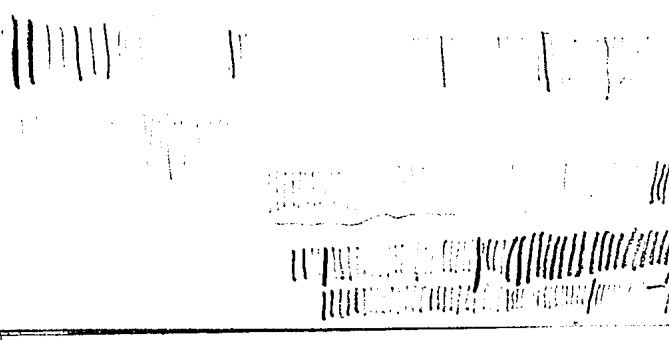


2nd Print



Thump

3rd



1/16 of 2nd

(18)

G. 6 - Can recorded 6 times, Boxes blown out 719 Blanks — appearance looked clean when put in graphite box — Didn't look at it in Micro --

Loud - No RO - Rumple RO
Corners in 1/4" in - 1" in nearly
Velvet / V RO - 1 1/2 VVV
Velvet near end fair to good on [illegible]

2nd Print
Very Loud - VVV - 1/8 in surface fair
RO [illegible] but action not sharp
1/2" - VVV last 1/2 of Record
fair to good surface

3rd print Loud VV 1/8th [illegible] V

Not [illegible] Enough [illegible]
Pressure [illegible] Clean
Expected [illegible]
Very Last 1/2 of [illegible] covered Enough

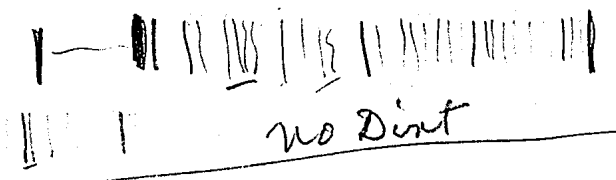
#2 better wash

G6 = 3rd Print. Recoated by Moore
Better start, good in 1/8 ✓
Must see dirt on blank before printing —

No 2 again coated better
good surface RO, - disappearance
1/2 way across —
This washing in making a test of a mould is very important, The handling of test blanks etc all way thru is very important to prove out mould,

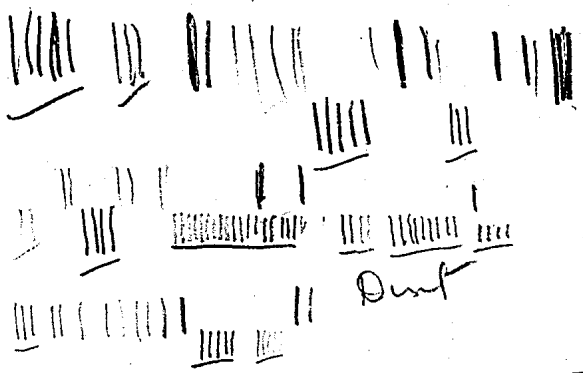
(21)

1st



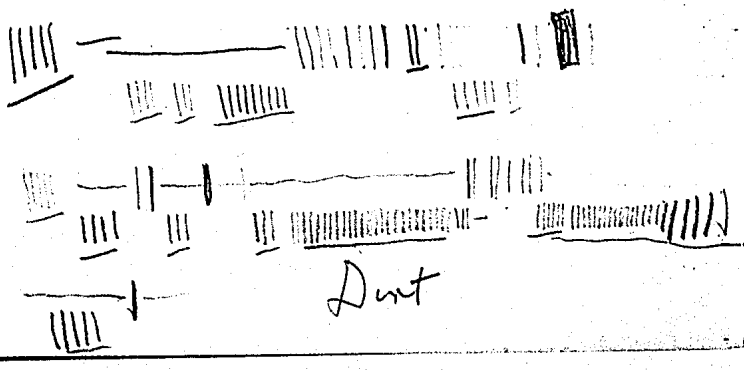
No Dirt

2nd Print.



Dirt

3rd print



Dirt

(22)

1st Print.

G 7 - 20 Times of the Cam in grafting —

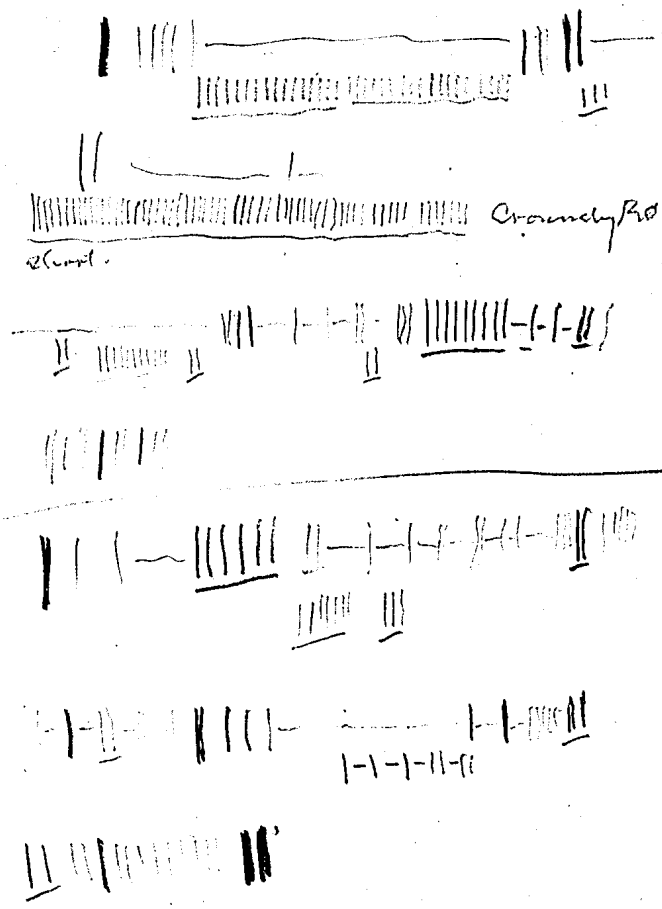
family velvet No RO at start 1/4" in VVV slots after get in 1/2 good surface VVVV/ - First start general surface is louder than should be but after get in 1/2 inch surface is good, but not V good —

2nd Print

Surface Velvet good - No RO - 1/4" in RO Lasting on 10 sec 8 thumps. has thumps of from 15 to 4 - groups of threads all through —

General Surface good but not V good —

3rd Print surface fair to good VVVV Not as good as 1st & 2nd



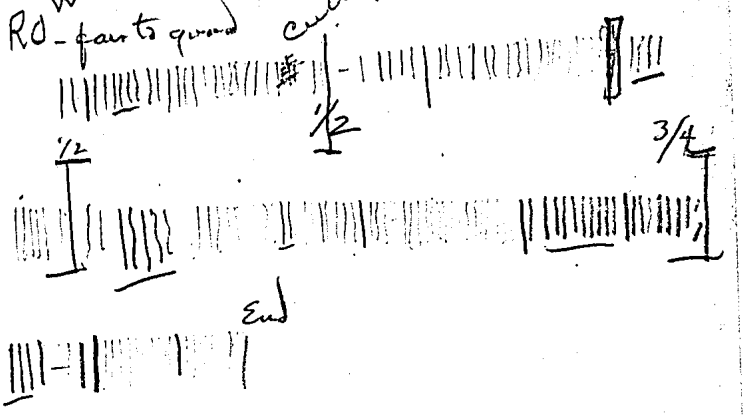
G6 No 1 print on Celluloid

Start Rough — 1/4" in only fair surface
about as loud as Condenser —

2nd print on Celluloid —
better than 1st. RO on this —
better surface —
general surface better than 1 but
fair to good.

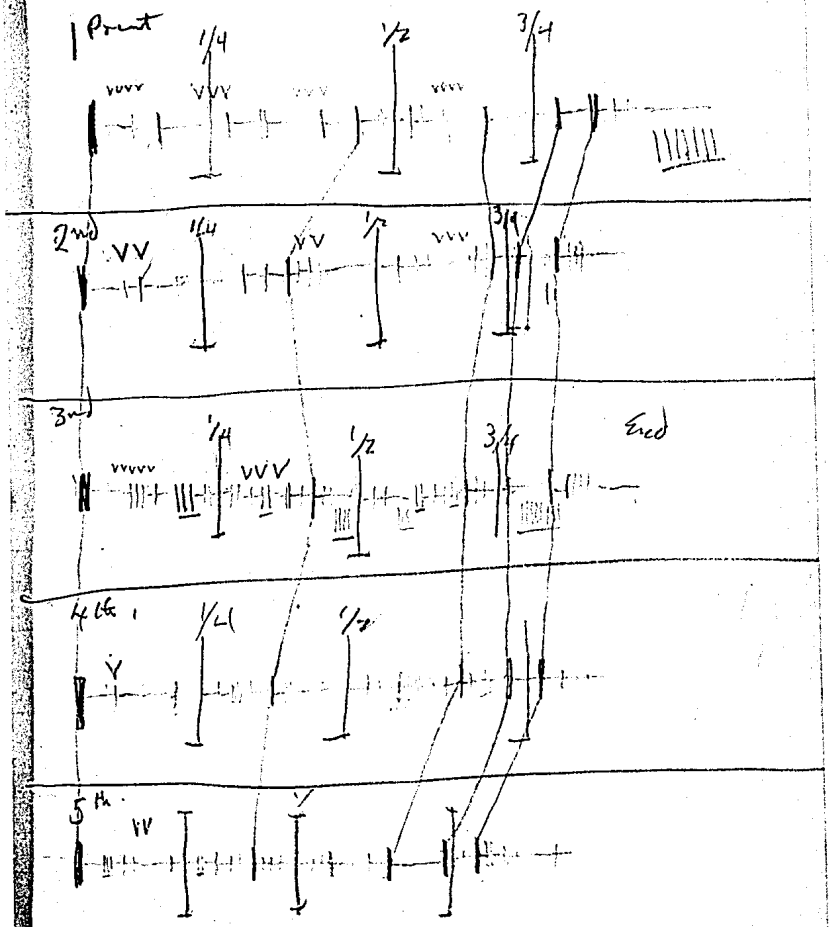
G-7 = 5th print - Printed record
with clean blanks + Cure
all wrong here

RO - VV - fair to good cutting



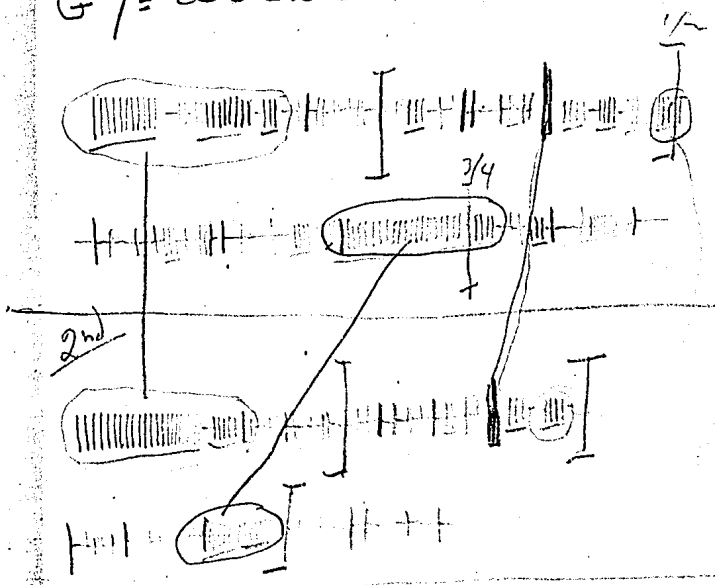
Washed it - Same record -

No 6 – 5th print.



~~G7 =~~

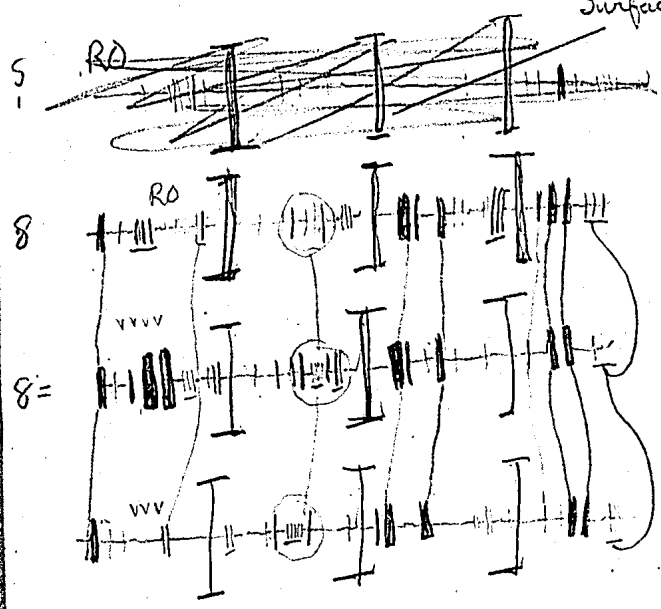
G7 = Leached + Primed with Care



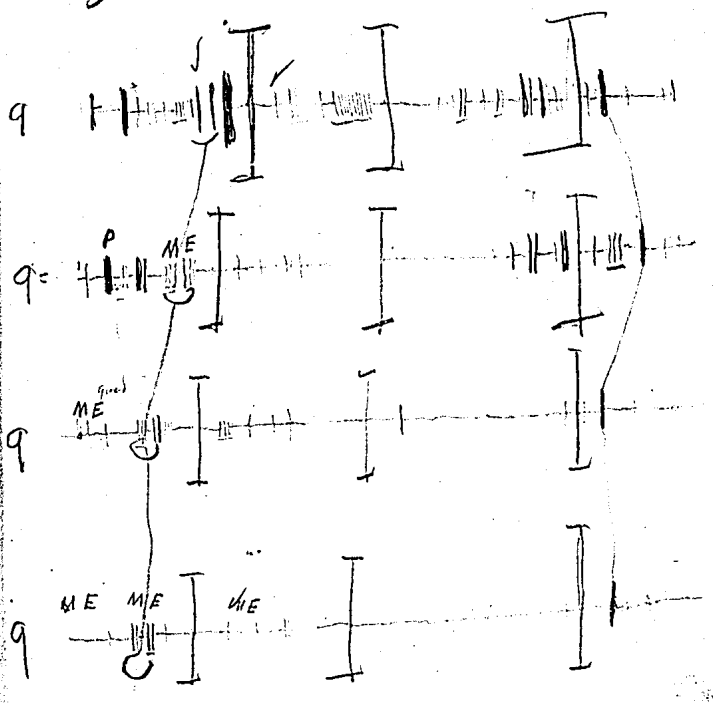
mechanical ~

Doubtful S

G 8 = Pad changed Twice –
Washed – Care Taken all way Run –
Surface fair



G g padchanged 4 times —



Experiments with Tito on Blank + heating only to see if Tito sinks, a'

Big blanks 12 – 2 min heat in press – Top not in contact with next plate, $\frac{1}{16}$ away

1 = Now sign of the fit mark on either Top or bottom, – shows small space on bottom where Label represented

2 = No sign on top – shows trace of Contact around center hole bottom plate

3 = Nothing on top – trace of of music on bottom about the center of music No signs Tito

No 11 - Nothing on top - Bottom - Trace of Label & one tit

12 = Nothing on top - shows traces of Label & one tit -

This shows bottom moulds are nearly hot enough, but ~~both~~ Top moulds are not hot enough to prevent mould from injuring

Also the further you go down the holler the bottom mould gets inquire how these were taken out -

4 = Bottom - traces of Label - Traces of a Tit on bottom nothing on top -

5 - Nothing on Top - Bottom - small part of Edge of Label shows -

6 = Top nothing shown - Bottom Label & music shows in spots

7 Nothing on top = Bottom traces music -

8 Nothing on top = Bottom Edge Label: 2 mm) round there is Music all round

9 = Nothing on Top = Bottom shows Considerable Music

10 - Nothing on Top - Bottom shade of Label

6 = Top. Nearly filled - Cooked blank looks like soft blank - Throwing out

7 = Top part label, Missing around Edges Tits good - Bottom Some Label, only faint Green Music - Tits good

8 Top = part Label + music all around Edge - Tits showed slightly - But Music + Label at def place - Tits good -

9 = Top Green Label + little missing at Edge Tits not good Bottom same -

10 = Top - Center bench lack pressure little music on Edge Tits faint Bottom like top -

11 = Top - Music def parts, Label a little faint Tits - Bottom - same as Top but Tits strong -

12 = Top - only Label tits pretty good Bottom like top -

Evidently Tits not high enough

12 - 3 minutes in Contact no preliminary heating -

1 = Top - Nearly whole Label printed 4 Tits showing - Bottom - Label 2½ dia + 4 tits showing -

2 = Top outer Edge Label shows 4 tits showing part of music all wrap around outer Edge for ½ inch showing - Bottom about same as Top - Tits show up good -

3 Top. No Label shows - outer Edge music showing - tits show good - Bottom Light Green from Label - Tits show up good -

4 = Top Label shows nearly all outer Edge showing music Tits good - Bottom same

5 Top - bushing in Center - shadow of music - Tits not shown good

10 = Top - Slight trace music Edge - trace of Edge Label Tits faint - Tits faint
Bottom - Tits good - little music on margin

11 = Top Label on margin - music faint on Edge Tits good
Bottom dotts -

12 = Top - Slight trace Label & music tits good
Bottom same - tits good

Find out how these taken out press

2 Heat - 3 Contact - Contact means Top plate you can just see light thru it -

1 = Top - bushing took pressure. Some music all over tits good - Bottom Like Top
Tits good

2 = Top - bush-up out Label music over Edge
Tits good - Bot Like Top, Tits good, not so much music shown.

3 = Top Label nearly full & considerable music Tits good - Bottom same

4 = Top trace Label - music all around Edge
Tits good - Bottom same as Top -

5 = Label shown - music at place
Tits fair - Bottom dotts -

6 = Music around rim - faint trace Label - Tits good - Bottom dotts

7 = Some label - music slightly on Edge
tits good - Bottom dotts

8 = Bush takes pressure little music on Edge
tits good - Bottom dotts

9 = Soft Blank

Wants higher tits

So that on 2 min heat it shows no point of any kind –

The tits as they are now would be ok were it not that blank blanks are unequal

1 min Heat 6 Contact,

1 = Top – Some Label & music on side go Tits OK
Bottom dello –

2 = Top Label – Tits good – Bottom same

3 = Top & bottom show considerable music Tits both sides good

4 = Both sides show considerable music – Tits good –

5 = Same as 4.

6 = only little music tits good – both sides same

7 = Tits good – Some music both sides.

8 – dello –

9 = dello –

10 = Some music both sides – tits good

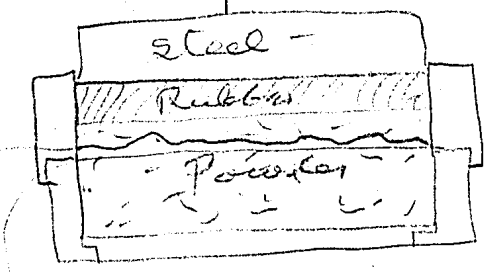
11 = dello

12 = dello –

9 10 11 + 12 don't get as hot as 1 2 3 4 – How were they taken out,

April 24 1914

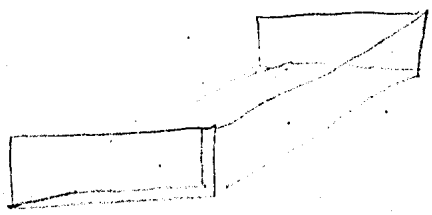
Expts with pressing powder in blank moulds by pure rubber plunger to get even pressure all over



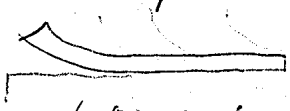
Line showing uniform pkg

Line after removing overplume

Then Steel disc is put in & pressed Result goes even homogeneous blank goes high % Transfers & Prints



Tried Wire to scrape off surplus — No good.
Tore great chunks out of surface. Wire Great too far to cut but not remove & then remove surplus by an Edge.
The lifting up of rubber didnt lift surface up like with the 9" piece of Rubber



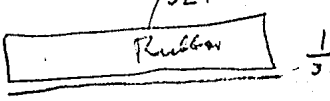
Lifted it this way

2

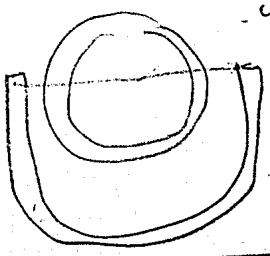
Experiments tonight is to find good way to smooth off the surplus stock after Rubber pad pressing without disturbing the powder in mould that has been pressed and to prevent sticking of powder to rubber & 3rd to get it cured & cheap

NO 12 =

1/32 Less dia

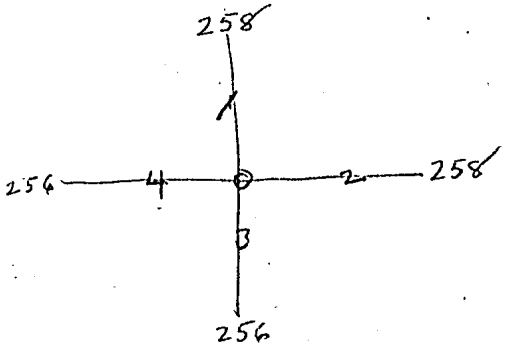


300 lbs — on 12" Ram —
Tried Wire to cut off surplus ~~but~~ Then
450 lbs to inch on powder



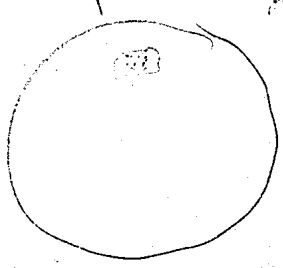
#12

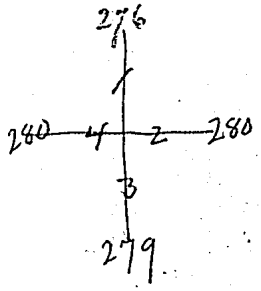
Calipers



Transfer

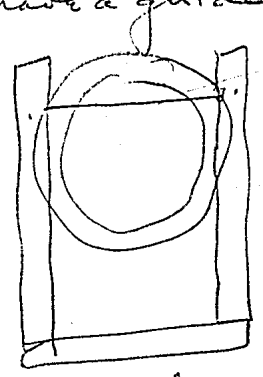
very shallow, only slight bend, see on opposite





3

but it wasn't made right, must have a guide there

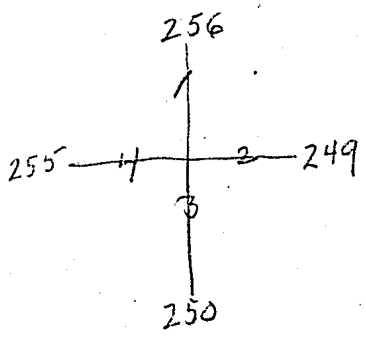


then wire won't spring —

The soft 1/32 Rub + 1/2" Rub lifted & bent up — detent double surface scarcely any —

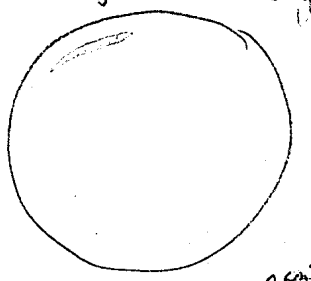
Little wire cuts thru sumplers without dragging & will be a success — LOE scraped sumplers off with straight edge but we are having a Rig dirt scraper tips made —

#13 Calliper



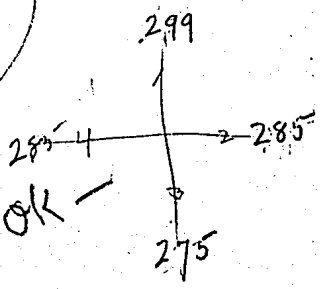
Transfer

both sides - flat spot - slightly deeper than -12 spot



Transfer

Calliper



Carbonitrid must be a little or more off perp

Print OK

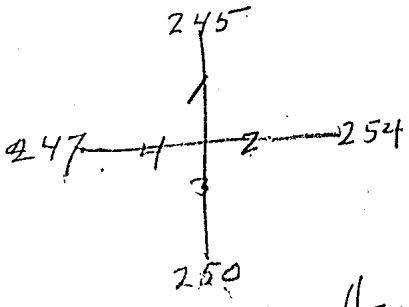
#13 -

Rubber disc - no Extra precip - only slight air bubbles - used wire it dragged out only a little in one thick spot it should be guided & held in frame

On 13 we used the Scraper with rounded edges it doesn't run much in box but leaves up in front & approximately in mat. the lining

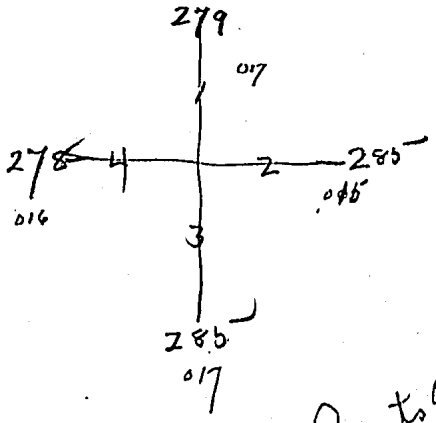
#14

005



#14

After Transfer

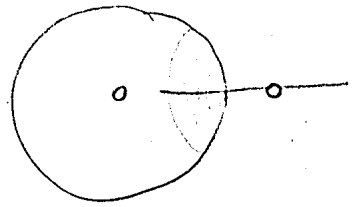


007

Prints ok

#14

Reg way 300 lbs on 12" Roll
packed | Reg scraper —
Rubber pad —
Scraped off by rotating
flat scraper



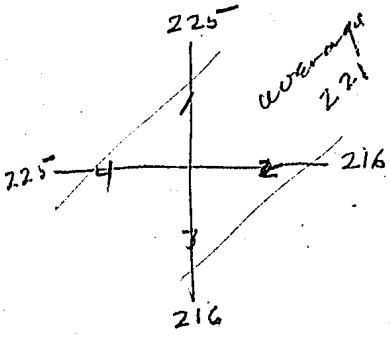
Turned around + advanced in 1st
Thus from of scraping —
perfect, dont disturb surface
we want + does it very
nicely — + finished up
man upon that makes
mistakes —

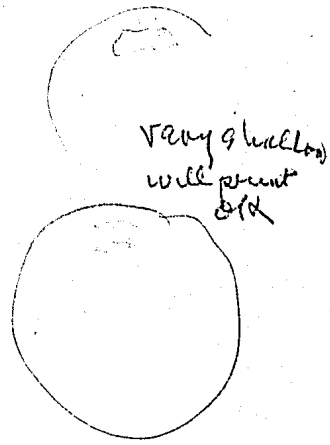
1-1 #15 2

Blank

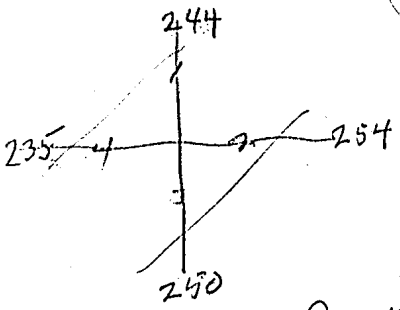
Dr 6

009



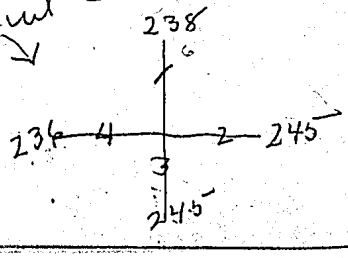


Transfer



019

Print is OK



Apl 26 1914

#15 = 37 scraper (new)

Use Ring turned down another tenth of inch now 8/10 ~~[illegible]~~ by using 450 opens there is no full 1/8 excess — less pressure. Excess by rotating front scraper works fine —

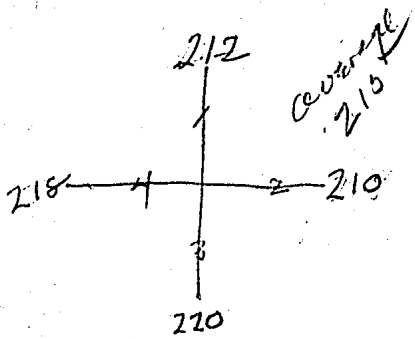
We had trouble get out Rubber pad but especially ~~[illegible]~~ steel plate stuck hard in brass ring —

We didn't set scraper down so far on this ~~[illegible]~~ hammer was going — didn't [illegible] stopping much as scraper not down as far as regular

Moore marked low side, angle marked Edge —

16 Blank

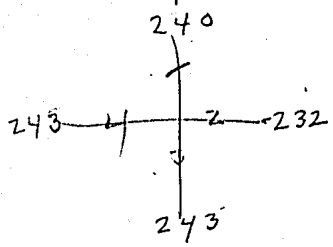
749 Varnish
5% Hyphard



average 215

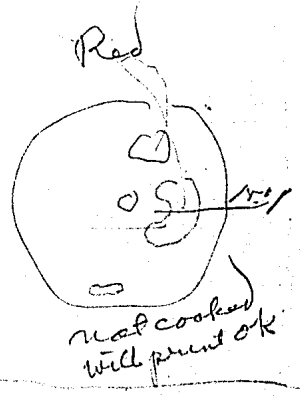
Deflection
-010

Transfer

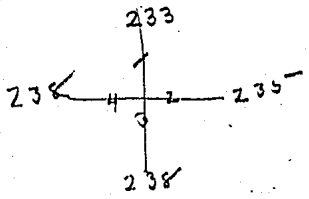


011

OK



Print



Print OK

#16

450 psi - 37 scraper

Not Rapped —

Surplus Milled off by triangular scraper

as we dont rap this is likely to be less Calliper than 15 =)

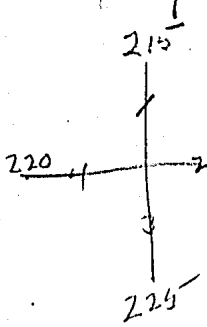
The Rubber pad stayed on Moore slide it off — it didnt left it surface fine — Edge rubber tore off edge of surplus but this dont matter as it must be taken off anyway

Put in flat scraper & instead of going to center & then turned to mill off surplus Raised whole mould clear across scraper

Fig It couldnt go far
Enough so we went nearly
across & then turned
the mould —

We can fix this by
2 Extra leafs that can
be let down between
reg leaves of scrapers

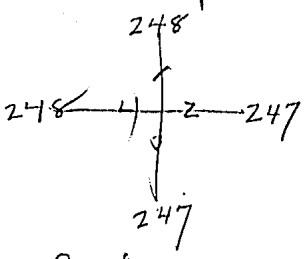
17 -



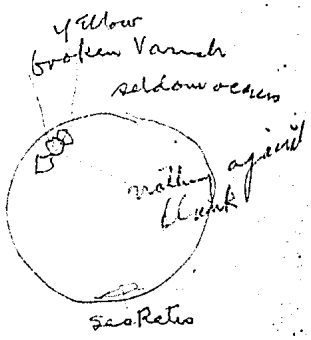
average 223

Def
010

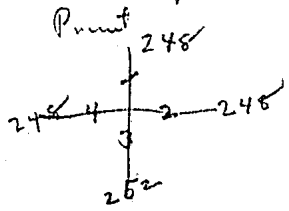
Transfer



001



Print



Print OK

bigger after
polishing or
no change -

479 Van

17

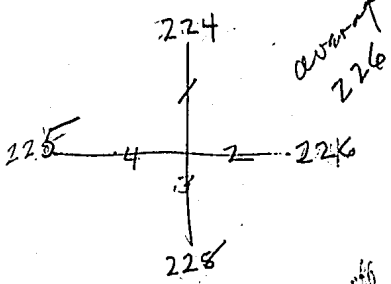
Straight Scraper 450 -
Rapped -

In stripping put under magnet. Then pressure on steel disc & rubber - then released pressure & rung. Then released steel disc by magnet then pulled out mould & rapped. Rubber ring from Coming with it lost part amplus powder scraped off - lost its OK -

Had to turn mould to mill off as pin was too long - also handle quitting scraper low enough to strike surface to mill off -

(57)

Blank



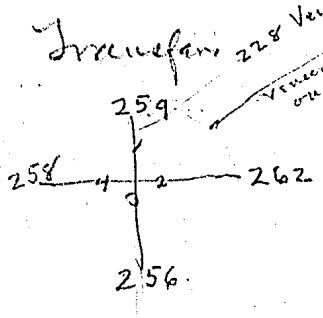
average 226

Deffman

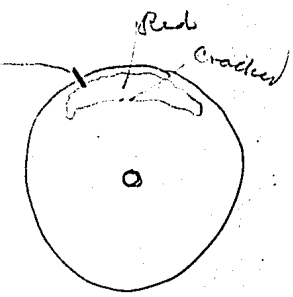
004

Irremefam 228 Veneer off

Veneer 016 on both sides



006



228

(58)

#18 1st Bad Transfer 779 Van

Dup of 17 -

Small Scraper

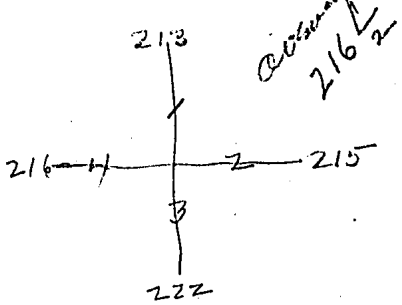
ng

Where the Red is looks as if not drawn looks as if Veneer to thick here to go Cooked out but by prior & showing it where fire or climated - seems to show that if veneer too thick one side it will Cannot thus

Note of Veneer

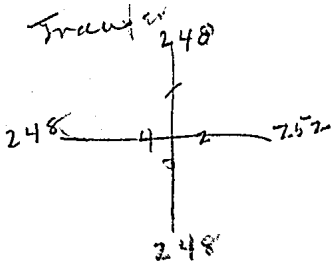
(59)

Blank



Def
009

Transfer



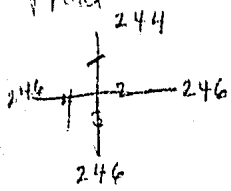
004

OK

Very light
Non-fading
backgrounds
only
used

Transfer

Print



002

Slight crease on
recorder
Multipins
OK

#19

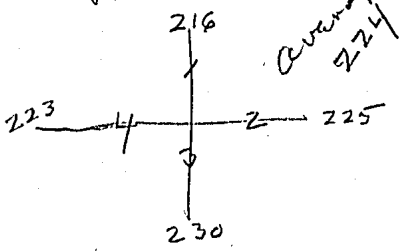
MYY Var

Dup 17

OK

(61)

Blank

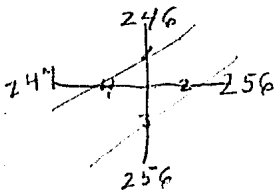


average? 224

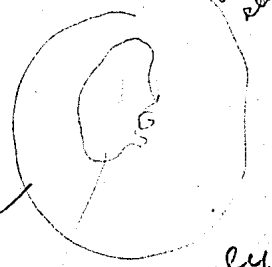
Dib — 014

Blank received very shadow

Transfer



010

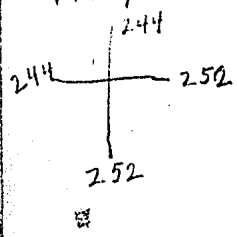


1 Bad

Overside only

OK Transfer

Print,



Print OK

(62)

20 MMQ Van

Drop of 17

OK

Blank 21

215

average 220

Difference

.011

219 — 4 — 2 — 219

226

218 veneer off

Red sheared one edge

Transfer 250

247 — 4 — 2 — 249

003

Sheet to polish

other side OK

250

013

224 veneer off both sides

21 779 Var

Dup of 17

No good

Thicker veneer at lefted sheared end upset,

Red End 035 for both Veneers

good End 026 "

Lt. per

Note Variance

(65)

632 Var

Blank

Low 221

average 227

232 — 235

High

231

014

Circumfer

dark Shell 10

240.

243 — 250.

250

OK -

D10

50

ok

Rubber faced To steel plate 22

(66)

All Numbers up to & including this, been tapping at 40 per min instead of 60 belt slipping

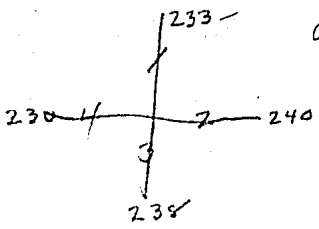
Secured Rubber to steel by Recovery

This is 1st one made this way its the 1/8 small & not the 1/32 smaller Dia Rubber —

(67)

All blanks up to & including 23 made on No 15 press & spiral cords - lifts up first.

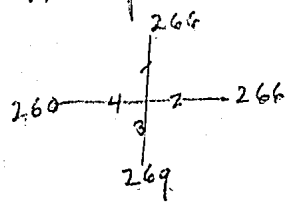
Blank



ave Calliper 235

Def 010

Transfer



009

Transfer OK no red

16oz

(68)

23 632 Var

The Hammers belt been slipping up to this time — Now 60

In raising up the Rubber it pulled up surface near Edge somewhat badly - all over there are waves scarcely that are 10 or 20/1000 high but its above the surface & probably only occurs in the compound about extend to good part,

Filled some fines over surface.

24 & hereafter well 6-8
made on No 4 press
Aldehyde Connection

Blank -

229 average

226

227 — 4 — 2 — 231

3

231

005

OK

Transfer

256

245 — 4 — 2 — 263

3

248

018

Transfer OK -
no Red

#24 632 Var

Drop of 17 - Hammer
Run $2\frac{1}{2}$/min -
which is little but longer
because probably scraper
was set a little lower -

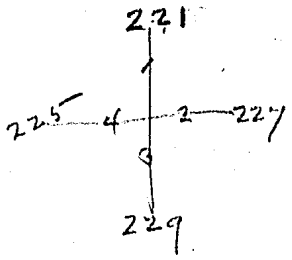
Surface after Cutting Rubber
was good on this, only
2 or 3 slight ravines

This one has the large full size
Rubber in - it stuck bad in
Brass ring - It took big
Caught Rubber & tore it.
Must use 1/8 smaller instead
of this 1/32 -

(71)

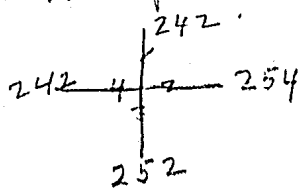
632 V

Blank



008

Transfer



010

OK not
[illegible] by
angle light w/
spots -

Print OK

No cracks
" poor [illegible]

25

632 Var

(73)

No 4 prem

450

~~Hammond 60 one one min stuff all spread -~~

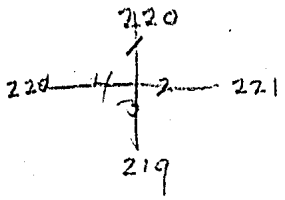
Hammond (60) one min -
max all spread

Note from 15 to 23 -

#15 to 24

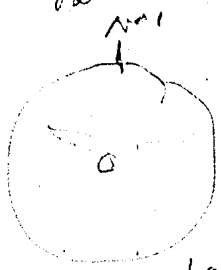
	Dif in Collap	Average	
	009	221	
	010	215	not rapped
	010	223	
	004	226	
15 press	009	216	40 speed hammered
	014	224	
	011	220	
	014	227	
	010	230	60 speed hammered
4 press	005	229	"

Blank



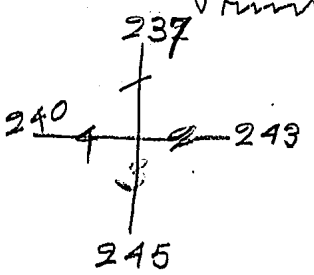
002

Blank No 1



dark shade

Print



008

H 26 No 4 Press

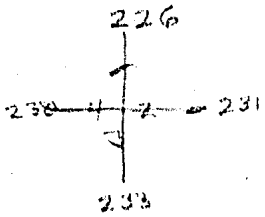
1450 — Strail Scraper

~~Hammers (60) of Oke mix - May all turn~~

Hammers 60 —
about mm to mix —

(76)

Blank 007



007

Prints OK

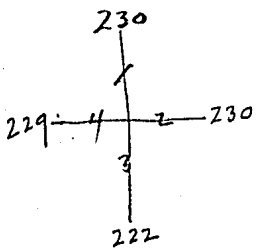
(77)

27- 4 press

Steel Scraper 60 knox

(18)

Blank



008

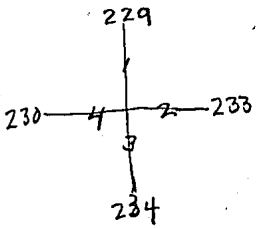
Print OK

(78)

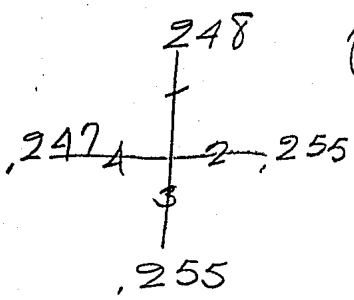
28-

Straight Scrapes - 450 grms. 1/8 pad

Blank



005



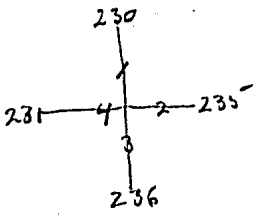
print OK

008

NO29 -

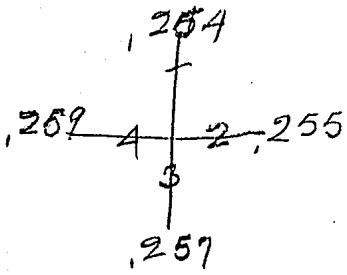
~~Straight~~ Scraper 450.gram 1/8 pad

Blank



006

Prints OK

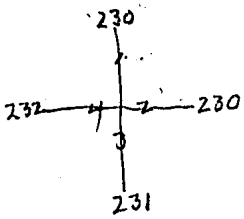


005

N-030 Pad 1/8 less dia than ring

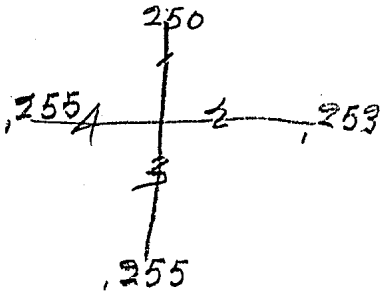
Straight Scraper .450 gram 1/8 pad

Blank



002

Prints OK

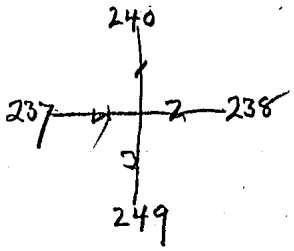


003

31-

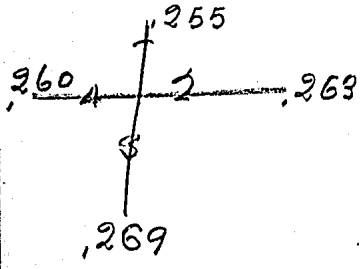
Blank Scraper 450 ½ pad
3 1/4 mm for powder to leave
Blank Edgeing blades act low

Blank



009

Prints OK



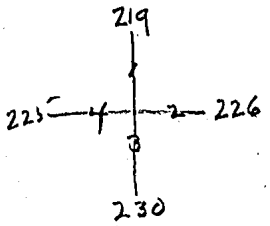
014

32

Strait Scraper 450 ⅛ pnd

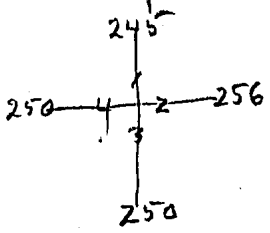
One minute for packer to leave Strait Edge in pkg

Blank



009 -

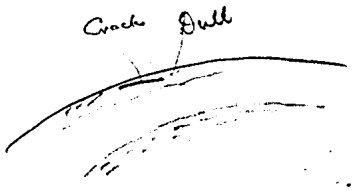
Transfers

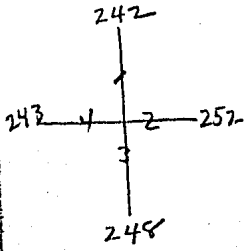


011

632 Var 208 Lat.

Print OK full print





010

33

Straight Scraper 450 grm 1/8 pad

Pkg 1/2 min on ~~Crack~~ Scraper
to leave Scraper Hammers 62 min

Blank

219
226 4 2 229
3
233

014

Transmission

248
252 4 2 248
3
253

632 Var Lat 208.

007

Print OK. no cracks - full print

241
245 4 2 244
3
244

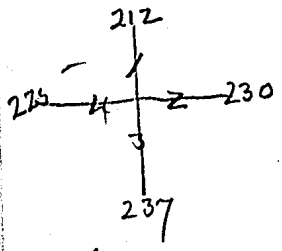
007

34

~~Strant~~ -

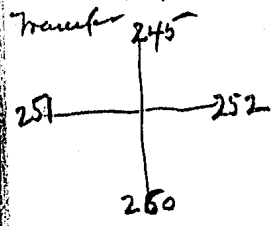
1/2 mm To pack -

Blank



025

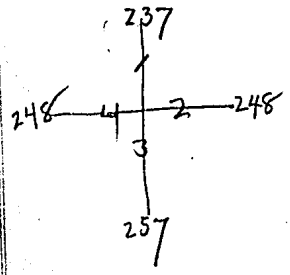
Transfer



632 Var 208 Lat.

015

Print OK – full print no cracks



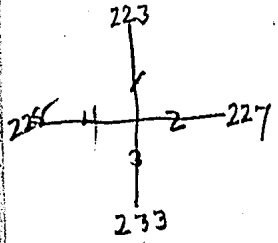
020

35

~~Straight Edge~~

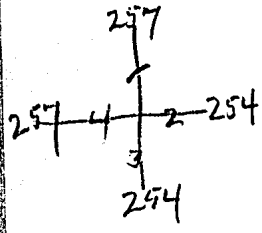
1/2 mm Topock

Blank



010

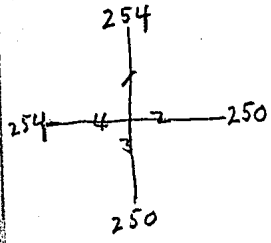
Trace of

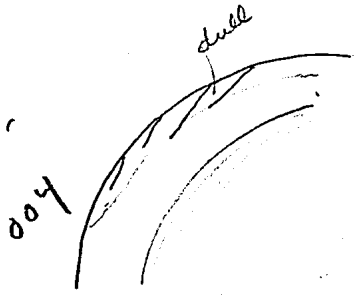


632 Van Lot 208,

003

Print OK full print,

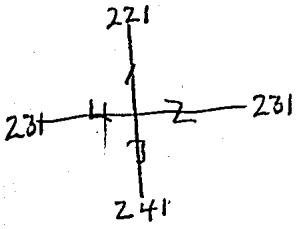




36

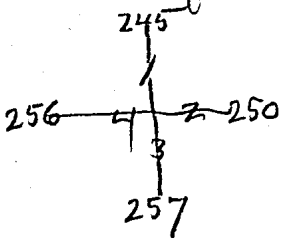
Otrail Scraper
1/2 mm load

Blank



020

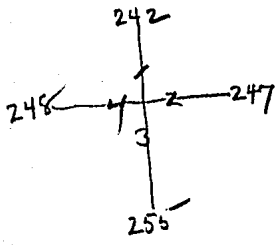
Transfer



632 Var Lot 208

012

Print – OK full print no cracks –



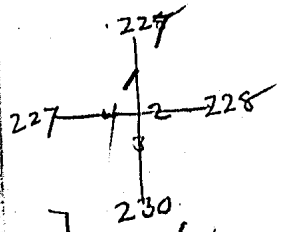
013

37

Strait Scraper

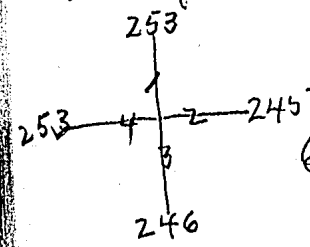
1/2 mm Lead –

Blank



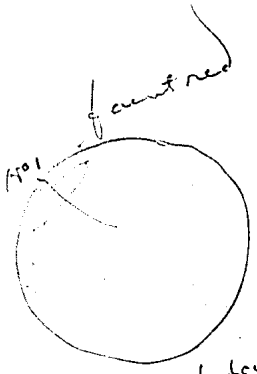
003

Transfer



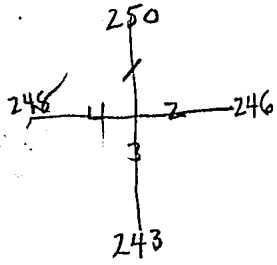
007

632 Vaw
Lot 204



Print OK - nearly full but OK.

only a shadow the OK



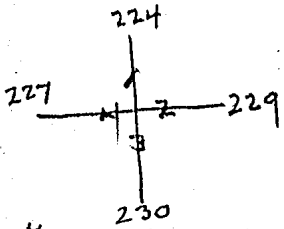
007

38

62 Knox

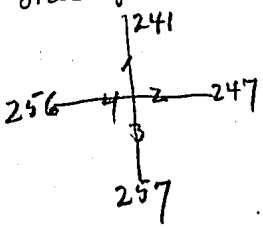
Strand Scraper
1/2 mm to Load

Blank



006

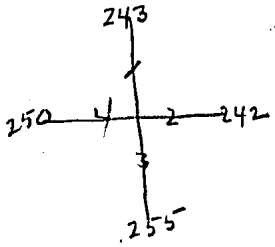
Transfer -



632 Var Lot 208

016

Print OK - filled fine cracks on dull way at Edge -



017

39

Strait Edge
1/2 mm

Blank

228

232 — 230

232

004 -

Transfer

254

261 — 245

266

632 Var lat 208

021

Print OK Concl -

257

256 — 257

259

003

Crest

Flat in Contact with mould shell -

Due probably to Unevn Varnish - see Calliper

40

Strait Edge

1/2 Mim -

6z Mox

Blank

225

228 — 1 — 2 — 227

3

230

005

Transfer

250

253 — 1 — 2 — 245

3

250

632 Var Cat 208

007

Print Ok full print no cracks –

249

250 — 1 — 2 — 243

3

245

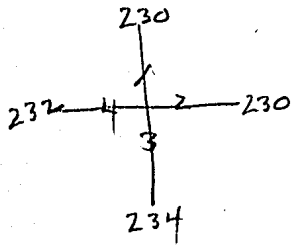
007

41

Strail Scraper 62 nox

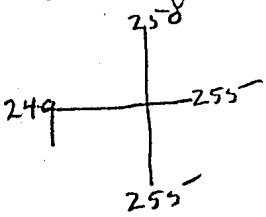
1/2 mm

Blank



004

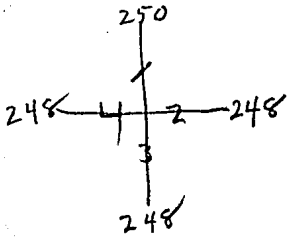
Transfer



632 Van Lot 208

006

Print OK filled no cracks -



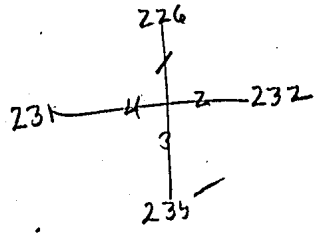
002

42

Rinsed Scraper -
1/2 mm Loading

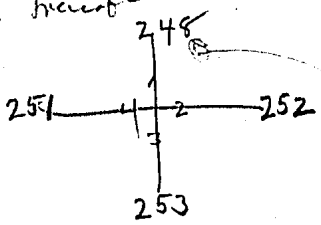
(107)

Blank



012

Incorrect

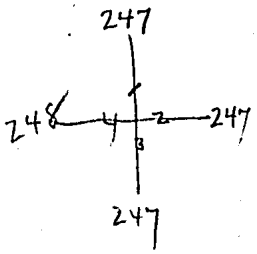


632 Vacuole 208

004

Lightfield but OK-

Print, OK-



001

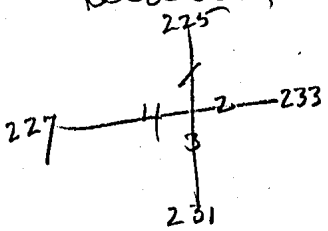
(108)

43

Strait Scraper

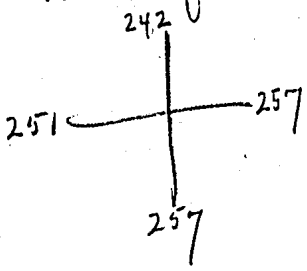
1/2 mm

Blank



008

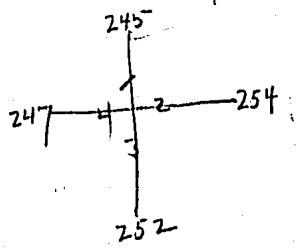
Transfer



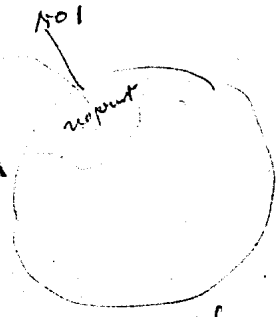
015

632.V

Print Badprint



009



otherwise ok -
will reprint -

44

Strait scraper
1/2 min loading

Have this reprinted

from 32 to 44 —
12 Blanks 100%
12 Transfers — 100% good
12 Records 92%

but lost print ok but didnt
fill music, will reprint —

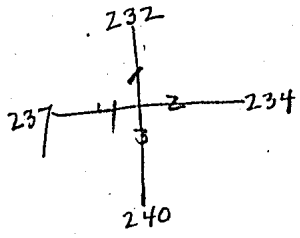
Up to here 44 Prints
3 lost, 94% Prints
100% Blanks
100% Transfers —

of the 3 lost I will reprint &
the other 2 were a special Varnish
& lost due to the Varnish —

(111)

*

We calipers 55



008.

* Moore says its in Press

12 Prints
all OK

(112)

Straight Edge Loader

45 Last –	
46	55 sec Loading
47	55 "
48	52 "
49	55 "
50	55 "
51	50 "
52	60 "
53	60 "
54	60 "
* 55	60 "
* 56	60
* 57	45 "

12

We now transfer & Print these,

* noticed one edge of metal disc in hydraulic lower than other edge this only just noticed – might have been doing it right along

30 sec Loading
30 " placing Rubber pad in
60 " placing Mould in press
30 " Removing Rubber
60 " Scraping off
30 " pulling Cover on
240

With auto scraper save 50 sec
Making it 190 seconds

60) 190 (3 min 10 sec
180
10

About 3 minutes, thus is
200 in 10 hours.

Think Can do 250 in 10 Hours
when Everything rigged up
right.

~~Starting at #17~~
~~No 1 Calipers 224 Transfer 259 – 35~~
~~1 " 213 248 35~~

Calipers on No 1 Line

	Blank	Transfer	1 print	Def
18	224	259		35
19	213	248	244 .004	35
20	216	246	244 .002	30
21	215	250		35
22	221	240		19
23	233	266		33
24	226	256		30
25	221	242		21
26	220	237		17
27	226	—	—	—
28	230	—	—	—
29	229	248		19
30	230	254		24
31	230	250		20
32	240	255		15
33	219	245		26
34	219	248	241 .007	29
35	212	245	237 .008	33
36	223	257	254 .003	34

(115)

	Blank	Transfer	Print		diff
37	221	245	242	003	24
38	227	253	250	003	26
39	224	241	243	+002	17
40	228	257	257	000	29
41 (No print not filled)	225	250	249	001	25
42	230	250	250	000	20
43	226	248	247	001	22
44	225	242	245	+003	17

Special blank

No. blanks	Transfer	Prints	Remarks
45	OK	OK	Cracked
46	OK	OK	
47	OK	OK	
48	OK	OK	
49	Dis	—	thin margin (cracked)
50	OK	OK	
51	OK	OK	
52	OK	OK	
53	OK	OK	
54	OK	Cracked	
55	OK	OK	
56	Dis	—	blister
57	OK	OK	crack
58	OK	Dis Cracked	* track Mould
59	Ind	*	two sides blister
60	OK	OK *	
61	Dis	—	two sides
62	Dis	—	blister
63	OK	Dis Cracked *	
64	OK	OK	
65	OK	OK *	
66	OK	OK *	
67	OK	OK *	

* Printed on track Moulds

No. blanks	Transfer	Prints	Remarks
68	OK	OK *	
69	Dis	—	thin margin
70	OK	OK	Cracked
71	OK	P.	
72	OK	OK	
73	Dis	—	blister one side
74	OK	OK	
75	OK	OK	
76	OK	OK	
77	OK	OK	bright
78	OK	OK	
79	OK	OK	
80	OK	OK	
81	OK	OK	
82	OK P.	OK	blister
83	OK	OK	
84	OK	OK	
85	OK	OK	Cracked dull
86	OK	OK	
87	OK	OK	
88	OK	OK	
89	OK	OK	
90	OK	OK	

4/28/14

No blanks	Transfer	Punch	Remarks
91	OK	OK	
92	OK	OK	
93	OK	OK	
94	OK	OK	
95	OK	OK	
96	OK	OK	
97	OK	OK	
98*	OK	OK	#632-218
99*	OK	OK	" "
100*	OK	OK	" "
101	OK	OK	" "
102	OK	OK	" "
103	OK	OK	" "
104	Con	OK	cracked in blister 632-218
105	OK	OK	632-218
106	to Dalley		
107	to Dalley		
108	to Dalley		V. 632-218
109	D OK	P. Punch	Cook center
110	D OK	OK	cracked Var. 632-218
111	D Dis		Cook center cracked Var. 632-218
112	D Dis		Var 632-208
113	D 2nd		" "
114	D 2nd	Dis	cracked " "

* tid raised quickly

4/28/14

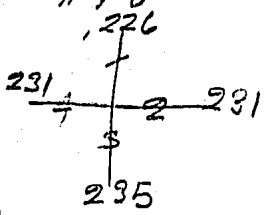
No blanks	Transfer	Punch	Remarks
115	D Dis		632-208
116	D Dis		" "
117	Dis		blister " "
118	Dis?	cracked	" "
119	2nd		" "
120	OK	OK	cracked " "
121	Dis	—	blister " "
122	OK	OK	crack on mum line " "
123	OK	OK	crack on mum line "
124	OK	OK	crack " "
125	Dis	—	blister and cracked
126	OK 213	OK	
127	OK 213	OK	crack
128	OK 213	OK	
129	OK 213	OK	blister & crack
130	OK 213	OK	
131	Dis 213	—	
132	Dis 213	—	blister
133	OK 213	OK	133 right comb
134	2nd 213	OK	fine crack
135	OK 213	OK	
136	2nd 213	OK	transfer front red
137	OK 213	OK	

(120)

Special

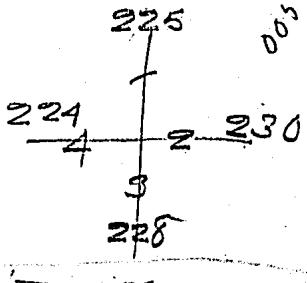
blanks #98, 99, 100
lid with rubber padd raised
quickly.

#98



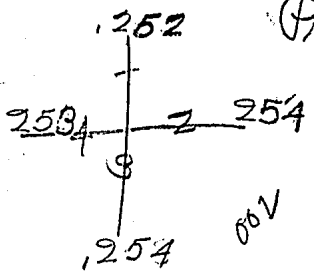
009

#99

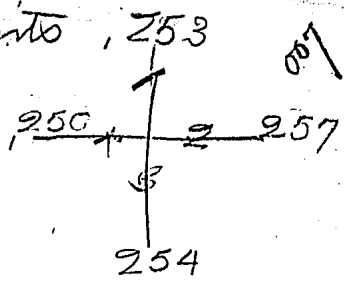


003

Printo

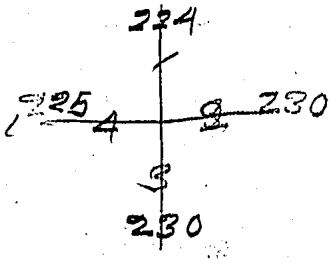


002

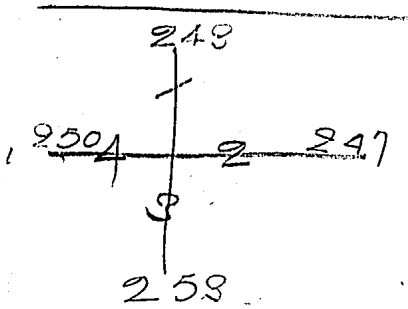


007

100



006



010

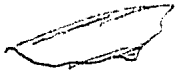
Powder test

4/29/14	at 9 am	38 %	fine
	" 12 PM	50 %	"
	" 3 PM	52 %	"
	" 9 PM	49 %	"
4/30/14	at 3 am	48 %	"
	at 9 "	45 %	"
	at 11 "	46 %	"
	at 2 PM	65 %	"
	" 2 30 "	55 %	"

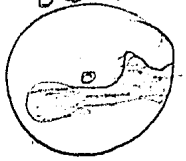
4/30/14
We are now using powder 50 % fine

Powder test 801
Sabing Blanks 32 % fine

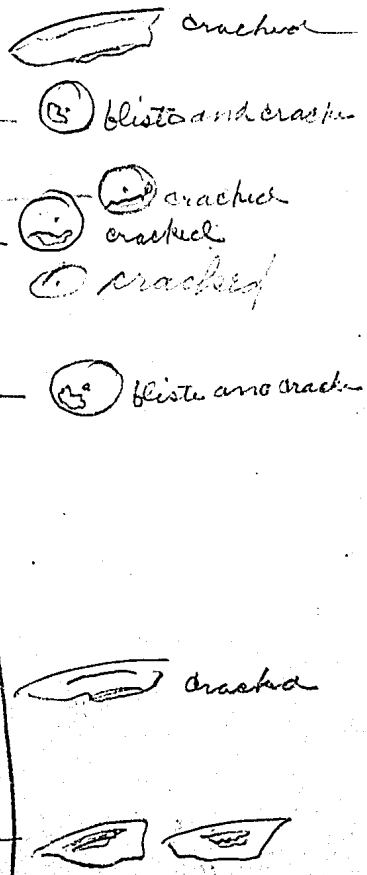
7/30/14

Pit blanks	Transfer	Remove	Remarks
138	OK 2/13	OK	
139	OK "	OK	
140	OK "	OK	cracked
141	OK "	OK	
142	OK "	OK	
143	OK "	OK	
144	OK "	OK	
145	OK "	OK	
146	OK "	OK	
147	Dis "		blister and cracked
148	OK "	OK	
149	OK "	OK	
150	OK "	OK	
151	OK "	OK	
152	OK "	OK	
153	OK 2/13	OK	
154*	OK "	OK	blank not
155	Dis "		blister and cracks
156	OK 2/13	OK	
157	OK 2/13	OK	
158	OK low 2/13	OK	
159	OK 2/13	OK	Very weak Cracked
160	Dis "		blister

blank has hard spot

154* 

No. Blank	Transfer	Remarks
161	OK	OK
162	OK	OK
163	OK	OK
164	OK	OK
165	Dis	
166	OK	OK
167	Dis	
168	Dis	
169	OK	Dis
170	OK	OK
171	OK	OK
172	Dis	
173	OK	OK
174	OK	OK
175	OK	OK
176	OK	OK
177	OK	OK
178	OK	OK
179	OK	OK
180	OK	OK
181	OK	OK
182	OK	OK
183	Dis	



(127)

No Blanks	Transfer	Punch	
184	Dis		blister and cracks
185	OK	OK	
186	OK	OK	
187	OK	OK	
188	OK	OK	
189	OK	OK	
190	OK	OK	
191	OK	OK	
192	OK	OK	
193	OK	OK	
194	OK	OK	
195	OK	OK	
196	OK	OK	
197	OK	OK	
198	OK	OK	
199	OK	OK	
200	OK	OK	
201	OK	OK	
202	OK	OK	8 blister & slit crack
203	OK	OK	
204	OK	OK	6 cracks
205	Dis		
206	Dis		5 crack center
207	Dis		4 cracked

(28)

5/1/14

No Bench	Sampler	Pumping	
208	OK	OK	
209	Ind	Dis	cracked
210	OK	OK	cracked
211	OK	OK	
212	OK	OK	
213	OK	OK	
214	Dis	—	crack cracked
215	OK	OK	
216	OK	OK	
217	Dis		cracked
218	Dis		cracked
219	Dis		cracked
220	Dis		cracked
221	Dis 5/2		blisters cracked
222	Dis 5/2		blisters cracked
223	OK	OK	
224 *	OK	Dis	
225 *	OK	OK	230
226	OK	OK	
227	OK	OK	
228	OK	OK	
229	OK	Dis.	cracked
230 *	OK	OK	

(129)

No. Blank	Transfer	Print	
231*	Dio		OK OD Blister
232*	OK	Dio.	[illegible]
233*	OK ○	OK	
234+	OK	Dio + Print	
235+	OK	OK	
236+	Dio		crackin
237+			
238+	OK ○	OK	
239+	OK ○	OK	
240+	OK ○	OK	
241+	OK	OK	
~~242+~~			
242+	Dio		crook Tool crash
243+	Dio	OK	
244+	OK	OK	
245+	OK	OK	
246+	OK	OK	
247+	OK	OK	
248+	Dio		Blister and crash
249+	OK	OK	
250+	OK	OK	[illegible]
251+	OK	OK	

Thank You

No. Bombs	Transform	Prints	
252X	OK	OK	
253	OK	OK	
253	OK	OK	
254	OK	OK	
255	OK	Dis	
256	OK	OK	
257	OK		
258	Dis		
258	OK	OK	
259	OK	OK	
260			
261			
262			
263	OK		
264			
265	OK	Dis	P. Punc
266	OK	OK	
267	OK	Dis	cracked
268	OK	OK	
269	OK	OK	
270	OK	OK	
271	Dis		blister cracks
272	OK	OK	
273		OK	
274	Dis		cracks center

+ Night work

No Blister	Trampe	Print	
275	Dis		blister
276	Dis		blister
277	OK	Dis	
278	Dis		blister
279			
280	OK	OK	
281			
282	Dis		blister
283	OK	OK	
284			
285	OK	Dis	P. Print
286	OK	OK	
287	Dis		crack
288	Dis		cook and crack
289	Ind	Dis	
290			
291			
292			
293			
294	OK	OK	
295			
296	OK		

5/5/15

No Bombs	Transfer	Bombs	
297	OK		
298	OK		
299	OK		
300	OK		
301	OK		
302	OK		
303	OK		
304	OK		
305	OK		
306	OK		
307	OK		
308	OK		
309	Dis		(6) Blister cracked
310	OK		
311	OK		
312	OK		
313	OK		
314	OK		
315	OK		
316	OK		
317	OK		
318	OK		
319	OK		

Blank	Transfer Punch		Baked Blanks
320	OK		
321			
322			
321	Dis		blank cracks
322	Dis		cracked
323	OK		
324	OK		
325	OK		
326	Dis		blister cracked
327	OK		
328	OK		
329	OK		
330	OK		
331	OK		
332	OK		
333	OK		
334	OK		
335	OK		
336	OK		
337	OK		
338	OK		
339	OK		
340	Dis		blister and cracked
341	Dis		blister cracked

(124) [134]

N. Blanks	Transfer Dents		
342	OK		
343	OK		
344	OK		
345	OK		
346	OK		
347	OK		
348	Dis		Blister cracked
349	OK		
350	Dis		blisto and cracked
351	OK		
352	OK		
353	OK		
354	OK		
355	OK		
356	OK		
357	Dis		blistr Cracked
358	OK		
359	Dis		Blister cracked
360	Dis		Blister cracked
361	OK		
362			
363			
364	OK		
365			

(125) [1985]

366
367 OK
368
369 OK

[ITEMS(S) FOUND IN BOOK]

1913(?) From N-13-12-08

Paullin —

Over in Store house where woodfibre is stored There is an old Dynamo belonging to me, To get it out please sign an Order that it is to be shipped to J.V. Miller Edison Chem Works Silver Lake — its mixed with your stuff —

Y. A. E.

[ITEMS(S) FOUND IN BOOK]

Miss Schmidt
Mr Buchanan 10/18
That he has formed
a Sanitarium near at
Pelican Lake, therefore the
matter is not required.

[ITEMS(S) FOUND IN BOOK]

E5791-4 version A

1. Comments by William H. Hayes on notebook, N-13-12-08, prepared for Adm. Harold G. Bowen

From N-13-12-08

N.R. Speiden
H.S. Anderson

Mr. Moore:

Experiment on Blank

8 December, 1913.

[ITEMS(S) FOUND IN BOOK]

This note book contains the recording of Mr. Thomas Edison while making experiments on the development of the original Edison disc record. It is in two parts; that dealing with the manufacture of the "blank" and that dealing with the blank surfacing on which the record was printed.

Mr. Moore, whose name is on the cover of the book was Sam Moore of Mr. Edison's "Insomnia Squad", a picture of which appears in the "Boy's Life of Edison", by Mr. Meadowcroft.

Explanatory Notes

The record, "blank" was molded from a powder whose composition was wood flower, chalk, lampblack and rosin.

The powder was made by dry mixing the woodflower, chalk and lampblack to which a wood alcohol solution of rosin was added. After further mixing this coarse mixture was vacuum dried to recover the alcohol. The coarse dry powder was then passed thru a ball mill which reduced it to a very fine dark grey flour. The flour was then ready to mold under steam heat and hydraulic pressure to form the blank which had a variable thickness of approximately one fourth inch. It was soft enough to scratch and during the printing process, which was done under higher pressure, was rendered to a thickness of approximately one-fifth inch.

The blank was surfaced with a varnish which in these experiments was first applied to a metal dish and dried. The blank was then sandwiched between two of these and heat and pressure applied. The varnish sheet in this manner was "transferred" to the blank as a veneer.

"Later the process was revised with the liquid varnish being applied directly to the blank. However, this was later than the time of these experiments.)

[ITEMS(S) FOUND IN BOOK]

The Equipment

The mixing was done in what appeared to be a bread dough mixers. They were horizontal metal containers with a horizontal spiral mixing blades driven by electric motors.

The vacumn dryers were large metal ovens, cylindrical, with a swinging door on each end and with steamheated shelves. The wet powder was placed in two-inch depth sheet steel trays which were slid onto the shelves for vacumn drying.

The molding powder was placed by hand into the demountable mold which consisted of ring bottoms with center pin-hole and pin. For loading with loose powder an additional ring was employed to retain sufficient powder.

After filling the mold by hand and striking the powder off level with retainer ring, it was placed in the first press. This was a fast ram which operated upward by air pressure against a thick rubber pad. This operation expressed much of the air from the loose powder. The retainer ring was then removed and the compressed powder struck off level with the top of the mold. A thin retainer ring and the top were then placed on the mold and the powder was ready to be formed into the blank.

The molding was done in a press consisting of an upward moving hydraulic ram with a tier of steam-heated plattens. The press mold held 12 molds.

The molding operation cycle was to first steamheat the molds, apply the pressure, chill the plattens with cold water, remove the pressure and remove the molds with the molded blanks.

After removing the blanks they were ready for the surfacing process.

Page 1. Experiment (719 Blot of Powder.)

This batch of powder was put in the dryer for the noted time and then molded into blanks under 1,000 lbs. per square inch pressure while heated by steam at 10 lbs. per square inch.

The blanks were then veneered with condensite varnish by the transfer method, using a pressure of 800 lbs. per square inch, heated with steam at 80 lbs. per square inch. This was the veneered blank ready to be printed between record molds.

The other factors in the blank processing are not recorded.

x R.O. is the abbreviation for "Run Out". It means that the music "runs out", or fades out, due to areas of light printing. x

Page II. The "Rotating disc" probably consisted of radial blades used in striking of surplus power from the mold. This type of strike-off equipment later became standard.

[ITEMS(S) FOUND IN BOOK]

Page 3: "Tapping" probably refers to the method of tapping the loose powder filled mold to consolidate the same before striking it off. This consolidating method was later abandoned for the air ram method.

"Pull Out" means that when the printing mold was separated a portion of the surface stuck to the mold and was "pulled out" from the finished record.

Page VI. "Blasts" means that the fidelity of the music was lost due to the skidding of the needle in the music groove. This was probably due to the speaker not being able to record loud music at that record speed.

To polish was to run the record under a rotary brush. This would reduce the blast as it would reduce the printing depth.

Page VII. "Knocks", "crackles" and "Scratched" and "Rough Surface", due usually to defective surfaced blank. "Run outs" and "Bad prints" usually due to blanks having low density areas.

"Cracked" - Records in process sometimes developed cracks radiating from center hole due to central circumferential stresses produced by radial flow of the record under high pressure.

Records sometimes developed circumferential cracks, near the edge. These areas later designated as "Parallel cracks" - (parallel to edge). These were due also to the radial flow of the record under pressure.

The writer determined (quite by accident in 1922) that these were caused primarilu by too high moisture in the powder which adversely affected the molding characteristics.

Page XII. The test recorded on this page does not determine whether defects arose from the printing mold or the surfaced blank. Last line reads "Rouge" (i.e. rouge polishing powder) " and I think kerosene."

[ITEMS(S) FOUND IN BOOK]

Page XIII. These are diagrams of the music groves as noted radially across the record. A "knock" is a surface defect which, if it extends across several grooves, causes the knock to repeat.

"Buckles" were wrinkles in the surface caused probably by flow of varnish under heat and pressure.

Pages XIV - XVIII. Nature of this test not understood by writer.

Page XX. Edison apparently concludes that defects in records may arise from dirt particles on printing mold and on blank. Washing mold corrects the former.

Page XXII. "Surface Velvet" good" - means absence of noise arising from scratchy surface characteristic.

Page XXIII. Blanks surfaced with celluloid instead of those preceeding which are presumed to be finished with condensite.

Page 32. "Tits on Blank" are presumed to be particles of blank varnish material extending above the surface. With sufficient heat this would soften and mold into varnish surface. With insufficient - they would cause defect in record.

"Top not in Contact with next Plate". This means that the press-rams was not operated to raise the mold to make contact with the platen above.

This test was to determine if heat alone would cause the tits to mold into the blank.

Page 33. Concludes from tests that sufficient heat reduces the hazard of printing mold defects caused by tits on blank.

Difference in mold temperatures could have arisen from location in the press or the length of time in the press. This is the thought behind Mr. Edison's "Inquire how they were taken out."

[ITEMS(S) FOUND IN BOOK]

Page 34. The "Labels" mentioned here and on previous pages were impressed in the varnish. Later, because of the high rate of defective label printing, paper labels were substituted.

Page 38. "2 Heat - 3 Contact". This is the operation schedule; heat platens 2 minutes then raise ram until contact is made with platten above where it was held for 3 additional minutes.

Page 39. Note last two lines: "Would be O.K. were it not that blanks are irregular". This indicates that the blank production method was unsatisfactory. The method used is not disclosed in this note book.

Page 41. This is the test that tried out the blank production method finally adopted.

The diagram shows the mold ring, bottom and top ring. The top steel plate and rubber pad were attached to the head of the vertically operated air ram.

Page 42. This device was tested to remove the surplus powder shown in diagram Page 41.

Page 43. This page may be clarified as follows: The thought of this experiment is to find a good way to smooth off the surplus powder after it has been compressed by the rubber pad during the ram operation and (2) to find method to prevent powder sticking to the pad at the end of the operation and (3) to get it to operate commercially and cheap.

Page 44. This shows the coordinates of a blank with marginal thickness in thousandths of an inch, as measured by micrometer callipers.

[ITEMS(S) FOUND IN BOOK]

Page 49. The fixed rotary scraper was adopted for production with the loaded mold conveyed to it on a rotating table.

Page 50. The irregular areas shown on blank diagram were areas which did not print satisfactorily. They will appear on many pages which follow. The cause was an uneven distribution of material; blank and veneer. Often areas are noted as discollorations - red especially.

The uneven distribution of material in the blank was usually caused by what were known as "Tear outs". Apparently they were not noted in these tests, altho they appear to have been present.

"Tear Outs" were areas where the scraper tore out powder below the level of the ring. When molded these produced soft spots which were unnoticeable to the eye, but which would cause Run Outs on printing. The primary cause was too rapid release of the air ram which blistered the powder in the mold prior to its being scraped.

Page 52. This is the first of blanks completed as records.

Page 53. In this case the rubber pad used in connection with the air ram was not cemented to the ram head. It was placed on and removed from the mold before and after that operation.

Page 54. First paragraph indicates the scraper had insufficient length to remove all the surplus material from the mold. Second paragraph is not intelligable.

Page 56. Start of tests using 779 varnish. Character of varnish not recorded.

Page 65. Start of tests on Lot 632 varnish. Character of varnish not recorded.

[ITEMS(S) FOUND IN BOOK]

Page 68. "It pulled up surface near edge somewhat badly". This is first indication of uneven distribution material in blank due to faulty operation at this point. Its significance seems to have escaped notice.

Page 70. - Note same, "only 2 or 3 slight raises"

Page 786 - Start of series of tests on 12 blanks (#32 - #44) from blanks thru printing.

Page 110 - Summary of same.

Page 112 - Tests on loading powder into mold by means of a straight scraper. This operation was done by hand. This was the later production method.

Page 113. Tests on processing powder in mold ready for going to presses.

Pages 116 - 125. Record of test blanks 45 - 369 thru transfer and printing.